Appendix 10

Information highlighting the presence of groundwater inputs on SSSI Unit 3, Catfield Fen

1. The following provides the best available information highlighting direct groundwater inputs to Catfield Fen.

2. There was a lack of monitoring of groundwater input to Catfield Fen prior to the commencement of local water abstraction in 1967, following increases in licensed amount in 1973 or following issue of new licenses in 1986 and 1988. Therefore there is a lack of empirical evidence to determine if there was or was not significant groundwater input historically and anecdotal evidence becomes the most important evidence available.

3. In 1988, Wheeler detected alkaline water at depth beneath Catfield Fen. In that paper it was not suggested that this water was from groundwater. Groundwater is certainly not the only explanation for the presence of alkaline water at that time, other explanations could be:

    - increased surface flooding from the river in the past, or,
    - latent alkalinity from the clay layer beneath the peat.

4. However, there is no available data to rule out significant groundwater input to Catfield Fen in the past and it is possible that this input provided adequate buffering capacity to maintain the majority of the Catfield Fen area as a calcareous fen. Prior to the 1970s, Catfield Fen was little studied and there is a lack of detailed ecological information. However from Parmenter 1993 it is described by various authors as 'a large reed hole', 'very boggy ground thickly dotted with *Peucedanum palustre'* and 'a wilderness of hidden pulk holes, bottomless mud and jungles of sedge'. These descriptions make no reference to a lack of water or scrub encroachment, the site up until 1970 sounds wet, treacherous and a mixture of open water, wet swamp and sedge beds. After 1970, the descriptions are somewhat different and have continued to the present day with a variety of parties expressing concern about the site drying out, including Jo Parmenter, RSPB, Butterfly Conservation, Natural England, Catfield Hall Estate, Tim Pankhurst, Geoff Nobes and Alec Bull.

5. The change in comment occurred around the early 1970s, shortly after the commencement of local water abstraction in 1970. This in itself is not sufficient evidence to suggest a causative link between abstraction and changes at Catfield Fen. However, there is further anecdotal evidence to suggest historic groundwater input to Catfield Fen which appears to have been largely lost since the 1970s.

6. In a letter to the RSPB in November 2014, Mr McDougall (who owned and managed Catfield Fen from 1945 to 1992) wrote: "There were a few springs as annotated on the enclosed map. Springs A and B were definite.. Spring C is indeterminate as I cannot recall its exact location" "Spring A was an exceptionally strong spring which ran for most of the year except in about 2-3 months in summer" but unfortunately "I don't think any visiting ecologists tested the water or were aware of the hydrology". Despite this there is recollection from Richard Hornby (working for Nature Conservancy Council at the time) of groundwater impacting on vegetation

communities, “there was some very high quality fen vegetation in some of the more open areas. We used to call this a "flushed fen", and as the area is very flat, I think it could only have been flushed by upward movement of groundwater, reaching the surface and moving laterally” sent in an email to RSPB in November 2014.

7. These recollections have been made by contacting 5 people who knew the site in the 1970s, two have not responded and one other (Peter Lambley) could not recall any springs and did not think that there were any though did not rule out some groundwater seepage. It is clear that these accounts do at least raise the possibility that there were significant groundwater inputs to Catfield Fen in the 1970s.

8. There is also some present superficial evidence of historic spring input to Catfield Fen. The pH data shown in Appendix 9 shows raised alkalinity toward the spring A noted by Keith McDougall. Although this pH reduces with depth and it is possible that there is some continued groundwater seepage from the adjoining ‘upland’ at the fen edge. This theory is supported by Tim Pankhurst, Regional Conservation Officer for Plantlife, who has independently observed that the vegetation community in this area and the character of the water (oxygen rich, cloudy) is indicative of groundwater input. He reached this conclusion when visiting the site in 2007 and 2008 and was unaware of Keith McDougall’s recollection of a spring in this area. The RSPB has also observed the cloudy nature of the water in this part of the site, continuing to present, and for that reason carried out pH sampling in this area. This showed a pH consistently above 7 in this area (Appendix 9) decreasing with distance and reaching more typical values around pH 6 found across most of Sluice Marsh and Island Marsh.

9. There is considerable anecdotal evidence that there was significant groundwater input to Catfield Fen before local abstraction commenced 1967 and at least until the 1970s. In 1988 it was shown that beneath the surface there was alkaline, base rich water. In 1991 concerns were first raised by Mr McDougall that local water abstraction may be causing the fen to dry out. Investigations since have concluded that some groundwater input still occurs into ditches and into some parts of the Fen to the East of Catfield Hall (Amec 2012). However, in 2014 it appears that there is no alkaline water under the surface of a major part of Catfield Fen and this strongly suggests a lack of significant current or recent groundwater input to these areas. Despite relatively stable sluice management since at least 1978 and continued intensive management for both commercial crops and wildlife, rapid successional changes have occurred and are occurring at the fen surface. These changes have resulted in the loss of over 1ha of the S24e community, threaten the survival of the UK’s largest fen orchid population and have impacted significantly on the internationally important invertebrate and plant fauna and flora. The AMEC model and main report has predicted a reduction in flow of 37% and a reduction in water level of 4.1cm to cell G, whilst this level of change may be critical in itself, the model and its outputs have been widely criticised by renowned ground water modellers and ecohydrologists and may represent a significant underestimate of the impact of continued and past local water abstraction. With the available information, the RSPB considers that it is likely that historic water abstraction has driven the deterioration of Catfield Fen and that there is a lack of confidence that continued water abstraction would not continue to drive further deterioration.